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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

BRANCH OF RESEARCH

MONTHLY REPORT

OF

FOREST EXPERIMENT STATIONS

FOREST ECONOMICS

FOREST PRODUCTS

RANGE RESEARCH

MAY - 1928



BRANCH OF RESEARCH

May, 1928

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FOREWORD

INCENTIVES

(From "Introduction to Organic Research," by E. Emmett Reid)

The Urge from Within and the Reward from Without. These are many and frequently get so intertwined that it is hard to distinguish them. In almost every thing a man does, his motives are more or less mixed. Why does one go into business? To make money that he may eat and have clothes. Yes, but many go into business who have these things and to spare and many more stay in business, toiling early and late, long after a competence has been obtained. Men love business because it is a game, a man's game in which one may find scope and exercise for one's wits and most strenuous efforts. Why do men go to war? For pure patriotism, to fight for the defense of their homes and the honor of their country's flag. Yes, but just a little bit because others are going and it does not look nice to be a coward. Why do men build hospitals and give to charity? On account of a disinterested desire to help those who are suffering and in need and because they love their fellow man — may their tribe increase. Yes, but it is nice to be considered a benefactor of mankind, or of one's city, and it is sweet to enjoy the sensation of beneficence.

The relative importance of the various motives varies with the individual and even with his mood or necessities.

It is the same with research. There are many and varied motives, curiosity, starting early in life with a desire to know what is inside the doll, reaching to the wish to know why the planets go round the sun; the fun of playing a game, of beating the other fellow to a piece of knowledge, of snatching from nature herself something which she has concealed from mankind for thousands of years, — a wonderful game it is too; pleasure of overcoming difficulties, many make the exhausting ascent of the Matterhorn for the rare exhilaration of triumphing over glaciers and craggy steeps, scientific achievement has its difficulties just as trying and its ecstatic moments of triumph when victory is won; the desire to increase human knowledge and to "think the thoughts of God after him"; and for others the lure of money, the pot of gold at the end of the rainbow of the experiments. Mixed motives these, sometimes high and sometimes sordid, but men are urged on to achievement and the results are for the good of the race.

(Over)

President Emeritus Ira Remson applies chemical terms to our motives: "It is not surprising that those who enjoy mental exercise should have a desire to spend their lives in research. Those who have engaged in this kind of work know that it is very satisfying. Ask anyone who has thus spent his life what his principal motive has been, and it is certain that he will say that it has been the satisfaction he has derived from it. There are other motives, of course, for motives are always mixed. Speaking in chemical terms motives are mixtures not elements. It is, however, not necessary to subject these motives to a complete analysis. It is sufficient to say that the chief constituent of those motives that lead us to undertake research is the mental satisfaction derived from it. If that were the only constituent, however, only comparatively few would be engaged in it, for fortunately it is necessary for most of us to make a living. Now, it is possible by practicing research to make a living, and this is coming more and more to be the case. The universities, the research institutes, and the more enlightened industrial establishments are calling for the services of researchers.

"If one who is giving his life to research asks himself whether his work is of benefit to his fellow man there can be but one answer. Every result of research must be of value ultimately. These results differ very widely among themselves. Some have the glory of the sun, some of the stars, but all help to illuminate the wonderful universe in which we live."

Curiosity, or the desire to know, a characteristic of mankind and apparently of some of the lower animals, is a great driving force in investigation. It leads men to pry into the secrets of nature and the more securely hidden they are the greater is the incentive to persist in the search. The philosophers of Athens spent much of their time wondering and arguing about the make-up of matter but were lacking in the experimental method which was brought to the front by Bacon in more modern times. Acquiring knowledge is like drinking sea water, each draught intensifies the thirst. If one is haunted by the desire to know what will happen when certain chemicals are mixed, one is likely to take the first opportunity to mix them and observe the result. One experiment awakens curiosity still further and others follow.

Professor Richards says of himself:

"In my case the incentive to the pursuit of science was primarily that intense curiosity concerning the nature of things which echoes down the ages from the time of the ancient philosophers. To the feeling of curiosity, as time went on, was added the perception that only through a knowledge of the fundamental laws of chemistry can men use the resources of the world to the best advantage. Any further gain in this knowledge must, sooner or later, directly or indirectly, give mankind more power. Even an abstract chemical generalization must ultimately be of priceless service to humanity, because of the extraordinarily intimate relation between theory and practice."

Dr. W. R. Whitney describes some of the joys and benefits of increasing knowledge.

"To the devotee scientific research may well become a religion, but whether he sees in the infinite possibilities of matter only the necessary results of permutations among seventy-odd decaying elements or the hand of an all-wise Creator ever uncovering new principles to hopeful investigators, he cannot be blind to the blessings of new truth. This is not produced to order.....It comes only from following with interest Nature's devious and unexpected ways, studying apparently irrelevant phenomena, learning by experiment regardless of aim. And since it is important to us that pioneer effort be individualistic, wanton, clean, but vagabond, it is this type of teacher whom we must support."

(To be continued)

FOREST EXPERIMENT STATIONS

Washington

Appointments

Although the experiment stations are not this year expanding because Congress did not increase our appropriations, a number of appointments are necessary to fill existing vacancies at the stations. Among the new members of the experiment station staff are the following junior foresters:

Ernest L. Kolbe, at the Pacific Northwest.
Francis I. Richter, at the Southern.
Chas. A. Abell, at the Appalachian.
H. L. Scholz, at the Lake States.

In addition to these, Hugo L. Sundling, formerly of District 3, is being reinstated at the Allegheny Station as an assistant silviculturist after a year at Penn State College. S. R. Gevorkiantz is being reinstated at the Lake States Station as a junior forester, following a year at Harvard, and A. B. Hatch as a junior range examiner at the Appalachian Station. Lowdermilk is also being reinstated this July, after several years' absence from the Forest Service, as a silviculturist at the California Station. In addition to these, Perkins Coville is coming to Washington to assist in the general work of the Office of Forest Experiment Stations and will be on the job around July 1.

Legislation

With the signature of the President affixed to it, the McSweeney Bill becomes a law. The pen with which the bill was signed and a letter of transmittal from the Secretary to Mr. Clapp, both appropriately framed, were given to Mr. Clapp by Secretary Jardine. With the help of this act it should be possible for us to make steady and material progress toward completing our ten-year program. Because of the needs of a number of regions, it seems best, at the start at least, to devote most of our effort toward building up work where current needs and demands are greatest.

Foreign Seed

We have had a number of requests during the past few months for foreign seed, and the demand seems to be increasing. While we are not in the business of supplying seed to foreigners just merely for their general forest planting work, still in many instances where a research project is involved as, for example, arboreta in connection with the for-

est experiment stations and the like, we have endeavored to meet the request. As opportunity affords, the station men might collect small amounts of seed and send it to Washington where it can be apportioned to those countries having requested it or desirous of trying American species. No special effort should be made in this connection, but quite often it is possible to collect small quantities of seed without undue exertion.

Equipment

The California Station has called our attention to the fact that there are gummed paper letters and figures made by the Tablet and Ticket Company, which afford a very convenient means for labeling cabinets, file drawers, map cases, and the like. These come in various sizes from 14" in height up, and make for attractive labels.

Library

Last month there were 1001 loans of books and periodicals from the library, and 127 members of the Service and others consulted the library in person.

During the month 260 books and articles were indexed for the card catalogue.

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NORTHEASTERN FOREST EXPERIMENT STATION

The Northeastern Forest Research Council met in the Chamber of Commerce Building in Springfield, Massachusetts, on May 1, with all but three members of the Council present. Director F. R. Fairchild, director of the Forest Taxation Inquiry, was present and discussed the work of the Inquiry, stating that work would begin in New England shortly. After some discussion, it was agreed that New Hampshire would be the key state for the study in New England.

The status of the various projects under way by the Northeastern Forest Experiment Station was given by Westveld, and the program for the coming year was approved. After approval by the Council the Investigative Program was passed for mimeographing and will be ready for distribution shortly.

Boyce spent three days at the Harvard Forest, where Professor Fisher showed him around. He was much impressed with the work there,

and can certainly recommend that any forester visiting in New England should spend a short time at least at the Harvard Forest. It is difficult for the Western eye to realize that some of the old-field white pine is actually marketable, although some splendid specimens of white pine in mixture with hardwoods rather relieve the picture. This forest, which has been under management for twenty years, is one of the places where so-called "dirt" forestry is being practiced. Next, it is hoped to find a place where that also much discussed but little understood "fundamental research" is being carried on.

Boyce and Westveld visited the sprout hardwoods plots near Simsbury, Connecticut, to check up on cutting operations. This area was burned over in 1924, and the purpose of the study is to determine immediate and future effects of fire on young sprout hardwoods, and the character of the resulting forest stand.

Stickel spent the entire month at the fire weather stations at Cranberry Lake and Elk Lake in the Adirondacks, the latter having been opened May 9, with A. R. Spillars, a junior at New York State College of Forestry as observer. As there was too much rain during the entire month to make the fire weather studies and inflammability tests of much value as far as hazardous conditions are concerned, Stickel devoted most of his time to the translation of the German resume of "Studies of the Development of Coniferous Plants in Raw-humus" by Henrik Hesselman and Elias Melin.

Wheaten spent the entire month in transferring permanent sample plot records to the atlas-sized forms, and in planning additional work, both in establishment and remeasurement, for the field season.

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CENTRAL STATES FOREST EXPERIMENT STATION

General

During the month two parties have been engaged in the oak study, one in southern Ohio and one in Maryland.

Meyer and Kellogg have been engaged in preparing working plans and in making short field trips in connection with other individual projects. An opportunity was presented to examine certain island lands in the Mississippi where the Mead Pulp and Paper Company is carrying on pulpwood operations. The spring flood conditions of 1927 prepared an excellent seed bed followed within a few days after the recession of the flood by the heavy seeding of cottonwood. All open spaces were regenerated in this manner to a dense stand of cottonwood seedlings. This

subject was of sufficient interest to this Station so that Meyer and Kellogg were assigned to accompany Swenning, Forester for the Mead Company on a trip to these islands. They looked the area over as a possible site for a working center in the Mississippi overflow land type. During this trip they also visited the offices of several of the state foresters and made observations with regard to location of plantations and woodlot areas suitable for grazing.

McCarthy attended the meeting of the Extension Foresters of the central group of states held during the month at Urbana, Illinois, and took part in the program. Several field trips furnished opportunities to observe the woodland types in the vicinity of Urbana. This resulted in the finding of areas north of Urbana which will be suitable for plots in connection with the hardwood yield tables.

Through a cooperative arrangement with the Botany Department of the University several seed beds were established on land furnished by the University. The purpose of this is to furnish planting stock for the Botany Department's small arboretum and some excess stock for future experimental planting.

The University authorities have decided to institute two years of forestry work in this University with the expectation that the student will transfer to another forest school for the completion of his work leading to a degree. Arrangements of this character had previously been made with several of the leading forest schools.

During the month Meyer and Kellogg and also Hanley's party collected pine pollen for the use of the Eddy Tree Breeding Station. The Central States Station furnished several species of seed in compliance with the request of the Washington office, for planting in an arboretum in France.

The Station has acquired a light Ford truck of the new model. In case other stations are contemplating buying these cars it will be best to investigate the possibility of having a truck back installed on the Ford roadster rather than purchasing the regular light truck. Space is very cramped in the truck and the seat is especially poorly constructed.

TS-12

Day and Schnur continued work on the oak yield study in Maryland during the greater part of the month.

Hanley and Bower have been very successful in the collection of oak yield data in southern Ohio during the month. The opportunity to work early in the season before the leaves had obscured their view enabled them to locate additional pure stands of oak in the region north

of Ironton, Ohio. Practically all of these were located in Lawrence County on areas previously cut over for charcoal production. They made one trip during the month into Kentucky to examine furnace areas near Irvine, Kentucky, and also visited the forest of the Kentucky Agricultural Experiment Station at Quicksand. Here, C. H. Burrage accompanied the party on an inspection trip but it was found that severe cutting and fire had left the prospective areas in a badly understocked condition. The party located some even-aged stands of oak on a tract owned by the American Rolling Mills Co. near Ashland, Kentucky. On one area near the Boone furnace, south of Greenup, Kentucky, a chestnut pole cutting was found. In order to check existing chestnut volume tables it was decided to spend several days in the collection of stem measurements for volume tables on this area. At the end of the month the party was again located in southern Ohio where the work of measuring of even-aged stands of second growth hardwood was being completed. This party has found that the furnace areas of southern Ohio will furnish few stands of even-aged, well stocked character where oak will not constitute a very large percentage of the stand. This is principally because the coves in this region are narrow and the mixture of other species with oak are limited chiefly to such sites and to mixtures with pine. McCarthy made one visit to this party during the month and inspected a greater part of the plots which had already been established.

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APPALACHIAN FOREST EXPERIMENT STATION

General

During May the study of mammals and birds at Bent Creek and other nearby points was finished by Mr. A. H. Howell, of the Biological Survey, and two other lines of work - the Appalachian utilization study and the management subdivision of the Bent Creek experimental forest - were started. Field assistant William B. Bramble, of Pennsylvania State College, reported for duty on May 21. MacKinney finished the card runs for the loblolly pine study, at Washington, and returned to Asheville on the 24th. R. M. Zeigler was transferred early in the month to assist Beal in entomological work at Bent Creek.

Methods of Cutting Appalachian Hardwoods

The analysis of the data collected last summer on cut-over hardwood lands in the Southern Appalachians was continued by Buell. At the request of District 7 he and Frothingham spent some time in developing a plan for an administrative study of restocking and growth on cutover National forest land.

Cooperation with North Carolina State Forester

At the instigation of J. S. Holmes, State Forester of North Carolina, a plan was worked out whereby the State Forestry Division sowed three seed beds to red spruce at the Experiment Station's field laboratory on Bent Creek, the State supplying the material for the frames and bearing the expense and the Experiment Station supplying the seed.

Bent Creek Experimental Forest

A good beginning was made at subdividing the Bent Creek experimental forest for management purposes. Buell drew preliminary compartment lines on the forest map and then began locating them on the ground. Upon his joining the millscale study part, this work was continued by Scholz and Bramble. Frothingham and Korstian participated in office and field discussions. After the location of preliminary lines, based largely on topography and factors affecting logging, criticism and readjustment will be in order before the management plan is drawn up.

Appalachian Mill Scale Study

Field work on the cooperative utilization study involving the Forest Products Laboratory, District 7, the Bureaus of Plant Industry and Entomology and the Appalachian Forest Experiment Station was started on the Galloway sale on the Pisgah National Forest. The party is now encamped on Stony Fork and is encountering the combined vicissitudes of rainy weather and a typical small portable mill operation.

The plans for the study call for collecting logging and milling data on grades, defect, overrun, production costs, and the amount of waste in the woods and mill. Other problems, such as an intensive study of defect from both the pathological and entomological aspects, improvement of small mill practice, characteristic defects in different species, seasoning methods, little-used species and logbucking practice, will be considered.

Loblolly Pine Management Study

Work on the loblolly pine growth data continued during the month. MacKinney spent the first three weeks in the Washington Office helping pilot the punch cards for the strip and accelerated growth data through the sorting and tabulating machines and getting help from Reineke in methods of attack on the tabulated data.

The work has not progressed far enough to warrant any general conclusions. However, in the work on the strip data it was evident that the 54 areas studied in the field were insufficient to warrant punching the data on cards.

Biological Investigations

A. H. Howell, Biologist of the Biological Survey, left Asheville May 28, after spending six weeks in the Bent Creek Experimental Forest making a preliminary survey of the problems of animal life in relation to the forest. Mr. Howell made an analysis of the fauna of three representative forest types of the region. These were the oak-pine type, the chestnut-oak type, and the cove type. The areas were systematically trapped for rodents, and a census of birds and other animals was made for each area. Also a strip tally of the tree reproduction was made for each area and these data will be correlated with the animal life.

During Forestry Week Mr. Howell gave a radio talk on the relation of animal life to the forest and a talk to the Asheville Boy Scouts, illustrated with live and mounted specimens. Mr. Howell's studies in the Bent Creek experimental forest served to arouse considerable interest among forest officers and rangers in the wild life of the region. The studies have also offered to the members of the Station an excellent opportunity to become better acquainted with the local fauna.

Forest Entomology

The greater part of the month was spent on odd jobs in preparation for the summer's work. About one hundred locust trees were treated against the borer (Cyllene robiniae Forst.). It was found that arsenite sprays and orthodichlorobenzine emulsion gave very effective control against this insect if sprays were used before the larvae penetrated deep into the wood. St. George returned to the Station on May 20, to join the mill scale crew now working on the Pisgah National Forest.

Dr. Ivar Tragardh, entomologist of the Swedish Forest Experiment Station, Stockholm, spent the last week of the month at Asheville, where he collected soil fauna.

A pine sawfly (probably Neodipron dyzri Roh.) has been found very abundantly this year defoliating shortleaf, scrub, and pitch pines. They are so thick in most pine stands that the dropping of the pellets sounds like rain. Late in May many sawfly larvae began forming cocoons. Indications point toward another generation this year and if this occurs severe damage will probably result.

The southern pine beetle, much reduced by the cold of last winter, has again confined its early attacks to dying trees.

Forest Pathology

Dr. C. A. Richards, pathologist at the Forest Products Laboratory, visited the Station on her return trip from the South on a survey of the

problems connected with the pathology of forest products. In company with Nelson trips were made to The Champion Fibre Company, at Canton, and the Mead Fibre Company, at Kingsport, Tenn. Mr. L. W. Jackson of the Office of Forest Pathology, Washington, D. C., also spent several days at the Station. Mr. Jackson is making a study of nursery soil in connection with his work on damping off.

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ALLEGHENY FOREST EXPERIMENT STATION

General

Forbes spent part of the month on the Allegheny National Forest where he assisted Hough and Kirkham with the work on the Little Arnot Management plots. He was also able to make a brief reconnaissance of the region near Warren, and located several areas suitable for future studies.

Enroute to Philadelphia, Forbes stopped at State College, Pennsylvania, to discuss the college program of forest research with Professors Ferguson and McIntyre.

Wood, with Lloyd's assistance, completed the external boundary survey of the headquarters forest at Camp Ockanickon. It was necessary to retrace about 8 miles of line.

The most necessary portion of the fire line at Camp Ockanickon was completed. The work so far done consists of the complete removal of all trees and brush from a strip 20 feet wide and $\frac{1}{2}$ mile long. The brush was piled along the sides of the line and the plans are to burn the brush when it is sufficiently dry and the season permits. Construction of this line cost \$58, or \$116 per mile. It was possible to supplement this line by "brushing-out" an old road, thus surrounding the southwest section of the tract. The work on this road cost \$14 per mile.

Kelley, Forbes and Wood began a type map and strip survey of the headquarters forest. This work which was continued at intervals until the end of the month, is still in its infancy, but already the old question, "What is a type?", has arisen. However, it is thought that a satisfactory system of type classification has been outlined. It is now planned to first map the types, later collecting stand figures and descriptive data to be used as a guide in establishing plots.

The final plans and specifications for the headquarters forest office building were completed, and it is hoped that the building will be ready for occupancy before June 30.

Kelley spent a few days at Camp Ockanickon assisting Mr. L. L. Lee of the New Jersey Agricultural Experiment Station in making a soil survey of the area. He was also able to add materially to the Station's south Jersey plant collection. During the month, Kelley completed a preliminary draft of his history of the forests of the Middle Atlantic States.

Very satisfactory progress was made on the repairs and alterations of the permanent quarters in Philadelphia. It is fully expected that the station will occupy these quarters the latter part of June.

Measurements

Schnur has been in Maryland and Delaware with Asst. Silviculturist Day of the Central States Station where they located and measured about 25 plots for the cooperative oak yield study. Schnur was also able to gain an intimate knowledge of this portion of the station territory.

Forbes, Hough, and Kirkham established two oak yield plots along the Warren-Tideoute Road about five miles from Warren.

Management

Hough and Kirkham have been on the Allegheny Forest at Warren where they have continued the work on the Little Arnot Management plots. This work has consisted of establishing and charting reproduction quadrats, the supervision of cutting on the plots, and the collection of age and height data. A fourth plot has been laid out, to be clear cut for both sawlogs and chemical wood. The chemical wood on the entire sale area, except the ten acres in our sawlog cutting and check plots has been sold and cutting begun.

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SOUTHERN FOREST EXPERIMENT STATION

General

Dr. C. Audrey Richards from the Laboratory at Madison spent several days in the New Orleans office, later visiting the Starke, Camp Pinchot, and Bogalusa branches. During her visit Demmon accompanied Miss Richards to Tulane University and conferred with Dean Bechtel, Dr. Hathaway, and Prof. Penfound concerning the use of the University laboratories by the Station. The cooperation established with Tulane University during the previous year will be maintained and both room and laboratory facilities were offered by the Dean and the head of the Department of Botany.

Mr. Alex K. Sessoms, of Cogdell, Georgia, spent a day at the Station plots at McNeill, Mississippi. This visit resulted in eight more men arriving two days later, and Wahlenberg showed them around the experimental areas.

Protection, Fire

Wahlenberg and Hills burned the longleaf fire plot at McNeill, while Barrett took care of the spring burns at Urania.

Management

Barrett located a number of suitable areas for thinning studies near Urania, with the expectation of establishing a number of thinning plots there later in the year. Barrett also completed a tentative working plan to be used in the establishment of thinning plots.

Naval Stores

At Starke the Kingsley Lake and Union City tracts were dipped for the first time, and on the Sampson Lake and Duke's tracts a second dip was made. The lateness of the spring seems to have had a decided influence on the yield of gum. The second dip showed an increase of but 23 per cent over the first dip, whereas last year it ran 50 per cent more.

The average maximum temperature during the period of the second dip was only four degrees higher than during the first dipping period, compared to a difference of 10 degrees in 1927.

Another outstanding result of the month's work was the fact that the French faces in the first dipping yielded 25 per cent more than the American faces of the same width on the same trees. It was also noticed that a very high yield was obtained from the split faces.

Old and new methods of turpentineing were illustrated in two trees cut down and shipped to the Branch of Public Relations in Washington.

Wahlenberg dipped and weighed the gum on the southern Mississippi tract of slash pine. This area will supply data for the gum yield table for slash pine growing near the western extremity of its range.

Forestation

Gemmer made a second application of ant poison and a recount of seed spots established as tests for ant damage.

CALIFORNIA FOREST EXPERIMENT STATION

General

Kotok and Hill met with a special forest advisory committee of the California Forest Protective Association, at which were present eight foresters in the employ of operating companies in California. The Station's program was discussed at length. Three problems suggested for the Station to undertake in addition to its present projects were - some work in the redwood region, studies of stocking in pole stands in the western yellow pine region, and studies of slash piling technique. The Committee was very anxious to see a mill scale study combined with a silvicultural study, as proposed by the Station, undertaken at the earliest date possible and offered its help to interest private operators. The Protective Association is employing Mr. Jacobson of the Western Forestry and Conservation Association to study the slash disposal methods now in vogue in the extreme northern part of the State in the western yellow pine belt. This study is designed to determine the relative costs and effectiveness of different methods now in use. At a later date this Committee will visit the centers of work of the Station and some of the more important methods of cutting plots.

Kotok met with the Los Angeles County Forestry Department and discussed the present and future program of the Station. The Los Angeles County Department will have almost \$400,000 in its budget for forestry and fire protection work in the County. This Department is a very active cooperator with the Station.

Dr. F. E. Clements, of the Carnegie Institution of Washington, visited our Barranca burn in San Bernardino County, where ecological studies in connection with our erosion plots have been established. A plan for coordinating the work of the Station with the Carnegie Institution in this field is being worked out.

Management

The work on the root system of western yellow pine was continued in the office during early May by Dunning.

Beginning May 14 remeasurement of methods of cutting sample plots was begun on the Stanislaus.

The Cow Creek plot has been severely damaged by windfall. No new growth can be expected for many years. During three of the five winters since cutting, severe windstorms from the northeast have thrown down or broken off many large trees. Similar damage occurred in adjacent virgin timber, and elsewhere on the sale.

Cutting is again approaching the old Cold Springs plots. Some time was spent in marking out boundaries and signing these plots to prevent damage. Arrangements are being made with the lumber company for a second cutting of one of these areas to release reproduction and to improve growing conditions. A tentative marking indicates that about 400,000 bd. ft. should be removed from the 20 acres if it can be done without too great damage.

One permanent yield plot in pure white fir was remeasured for the first time this winter. The stand is 80 years old and growth is now declining rapidly because of severe competition. Wood choppers have cut two dominants from the center of the plot to get out a snag and insects killed a large border tree.

Cover Type Map

Wieslander and Clar have been summarizing in usable form the 700 sample plots taken in connection with the Angeles cover map. This summarizing is bringing out in a striking way distinct differences in the chaparral cover between various localities with reference to composition by species, height, density, penetrability and depth of humus and litter.

In cooperation with the District Forester, arrangements were made to have two topographic mapping parties secure cover types in connection with topography on some 550 square miles in remote sections of the Klamath and Shasta forests. Wieslander and Clar will spend most of June with these parties, coaching the topographers on cover types.

Wieslander spent a day in San Francisco with the photographic section of the Army and with a commercial aerial photographer looking into the possibilities of aerial surveys for sections of the state lacking in either topographic or other suitable base maps. In this connection photographic maps were found available covering the entire Mokelumne River drainage in the Sierras, about eight square miles in the redwood region of Santa Cruz County and 600 square miles in Monterey County. As these maps cover every conceivable type in California, they should give an excellent idea of the possibilities for cover typing.

Planting

Five hundred trees raised at the Feather River nursery, representing different age classes of Pinus ponderosa and Pinus ponderosa scopulorum were set out in the brushfields of the Shasta forest. The area planted was a deep, loose, volcanic ash soil and was covered with a dense stand of brush 4 feet high, principally Ceanothus velutinus and Arctostaphylos patula. The brush was entirely uprooted by use of a tractor and grader. The experiment is designed primarily to test the effects of root competition from brush in the establishment of conifers.

A progress report of the Station's work for this region was prepared by Kraebel and submitted to our cooperators. This included a financial statement showing how the cooperative funds were used and estimates for the coming year. Kraebel has been engaged for the last six weeks in examining the Barranca erosion area and securing detailed notes of the ecological plots established on the burn. He also made an examination of the extensive plantations set out last winter from stock furnished by the Devil Canyon nursery. At the nursery about twenty seedbeds, chiefly Coulter pine, have been set out. The following transplants are now growing at the nursery:

Kraebel also examined, in cooperation with the Office of Range Management, an area on the Santa Barbara which has been under observation for a number of years studying the effects of sheep grazing in the pure Jeffrey pine stands of southern California. The results as shown by reproduction counts are quite striking.

The contrast in grass and other herbaceous ground cover was equally striking even thus early in the season and long before the arrival of the sheep. The almost total absence of shrubby species may account

in part for the severe damage to the reproduction. Kraebel's memorandum suggests further study here and submits the proposition that in forests so essentially valuable as protection (and incidentally recreation) forests it is probable that any grazing may prove to be over-grazing. This proposition may be determined on the basis of financial returns from the short-term heavy-damage grazing business, as compared with the other values, less easy of appraisal but unquestionably high, which that business jeopardizes.

Extensive photographs were also taken of the severe burn of 1927 on the Angeles, showing the first week's erosion and the progress of re-vegetation.

On the Devil Canyon "fan," about a mile below the Barranca erosion area, M. H. F. Blaney of the Rural Engineering Division, B.P.R., has begun an interesting study of the percolation of rain waters through the sands and gravels which compose this typical outwash plain. The installation comprises a shaft and two drifts, one at 12 feet and the other at 20 feet below the surface, sprinklers for producing controlled rainfall, and devices for collecting and measuring the water which may reach the drift ceilings. Similar installations are placed at Fontana and Cucamonga, the work being part of the general survey of the Santa Ana watershed in which county, state and federal governments are cooperating.

Entomology

Both Person and Struble spent the first week of May in the field, near Northfork, California. The purpose of this trip was to make a final examination on some of the Cascadel experiments of 1927 and close up the work there. Most of the 1928 field studies will be carried on in the Modoc National Forest.

On May 16, Struble, accompanied by Mr. Greene, a forestry student of Syracuse on temporary assignment, left for the summer headquarters, which will be in the Fandango area of the Modoc National Forest.

Person has spent the latter part of the month completing plans for the season's field experiments and finishing the report on the Cascadel studies of 1927. He expects to join Struble on the Modoc about June 1.

Products

Blue Stain. Mr. Brundage has spent most of the month at the Sugar Pine Lumber Company, Pinedale, taking down the piles put up last fall treated with Fungimors, and also the control piles. A rather large amount of lumber was treated and the work of taking down the piles with

adequate inspection to get real information is a big job. The inspection records the kind of stain (brown or blue), location, extent, intensity and character of stain classified according to whether it is log stain, sticker stain or board stain. Record is kept for three operations - grading into the pile (done last fall), grading out of pile (rough), and grading after running through the planer. This has made a real job out of what started as a side issue. The results, however, bid fair to amply justify it. It is already clear that the Fungimors, while helpful to a certain extent, is by no means a complete preventive, at least in the dilution recommended by the manufacturer. The work is resulting in a volume of detailed data on the occurrence and development of blue stain, which we have not seen record of from any other study and which appears to us to be of tremendous potential value to an understanding of the problem.

Pulp and Paper. Due to the failure of cooperation for this year in the proposed major project involving lumbering and mill waste, it is now proposed to take up in cooperation with the Office of Forest Management a study of the economics of the pulp and paper situation on the timber sale area of the Sugar Pine Lumber Company. Such a study will be of material aid to the company in the plans which they have now under consideration for pulp-board manufacture, and will also be of great value in connection with the Forest Management plan of the Sierra National Forest throughout a large area whose inclusion is contemplated in the 30-year timber sale to this company. This value will arise largely through the determination of the relative cost of delivery to and use in a pulp mill of sawmill waste and of true-fir round material. It should determine the feasibility of extending the sale to the lumber company to the higher elevations where the stand is either pure fir or fir in such large proportion as to have made it unfeasible for lumber utilization.

An interesting development in connection with the Sugar Pine Lumber Company plans for pulp-board manufacture has been the recent appearance of a Belgian with a proposal for the manufacture of such a board entirely from mechanical pulp. His proposal was looked over at this office as thoroughly as circumstances permitted and the judgment of the Forest Products Laboratory upon it requested.

White Fir and Heptane. These two projects have no connection except that the typing of the final reports on each are in progress and have both been delayed by unforeseen pressure.

Wood Preservation. A research assistant named Gordon, at the University of California, working primarily on problems of the cure of certain horticultural diseases under Professor C. B. Lipman in agricultural chemistry, has developed a new method which they think very promising for the treatment with preservatives of standing trees. The method somewhat recalls the Boucherie process, but consists in applying a preservative under slight hydrostatic head through tubes into small holes bored completely through the trunk of a tree, and all the holes except the feeder inlet being then plugged. They claim to be able to penetrate the entire sapwood of a standing tree of pole size with a very

considerable impregnation volume in as short a time as it can be treated in a pressure plant. Whether the process will be commercially feasible on the score of labor cost remains to be seen. Through connection with certain Southern Pacific officials the creosoting organization of that company has been drawn into a test of the method, which is being carried out on stands of the Albion Lumber Company.

Lumber Census. The census is now very largely complete, only a small number of delinquents remaining to be followed up. A large consignment of the edited returns has been sent to Washington.

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PACIFIC NORTHWEST FOREST EXPERIMENT STATION

Effort has been made to give the best possible publicity to the current output of the Station and a number of news notes have been prepared and sent out. Among these were three separate digests, intended for various types of audiences, of Meyer's article in a recent Journal of Agricultural Research, entitled "Rates of Growth of Immature Douglas Fir as Shown by Periodic Remeasurements on Permanent Sample Plots." Also 400 copies of McArdle's "Rate of Growth of Douglas Fir Forests" (a digest of the results of his Douglas fir yield study), and 100 reprints of Simson's "This Humidity Business" have been mailed out with a personally addressed letter to carefully selected lists of names.

More Douglas Fir P. S. P.'s

Meyer with Isaac's help put in another set of permanent sample plots in second-growth Douglas fir on a rather high-altitude site on the Rainier National Forest not far from two other series of permanent plots. He also helped officers of the Cascade National Forest to put in some thinning plots in a second-growth fir stand near our proposed center of work at Oakridge, Oregon, where there is a chance to make a sale of piling under a partial cutting system.

Growth and Yield Study of Western Yellow Pine

The working plan for this study, mentioned in the last report, has been sent to the other yellow pine experiment stations for review and comment in the hope of adopting a technic here that will represent the best thought of all Districts and which will be adopted throughout the range of this tree wherever local studies are made. Conference with the District 6 men has already been had. Meyer started for the summer field work on this project on June 1, and at the beginning will work coincidentally with Westveld on the methods-of-cutting project.

Methods of Cutting, Western Yellow Pine

Westveld and a field assistant spent the entire month on the Crater National Forest examining four methods of cutting plots which were established last year and logged in the late fall and early spring. These plots represent different intensities of cutting in western yellow pine, with reserve stands ranging from 3,000 to 9,000 board feet per acre. The individual plots show losses in logging of 8 to 11 per cent of the total number of trees between 4 and 11 inches. From 50 to 80 per cent of these trees are probably the fastest growing trees on the plots since they were young dominant and open-grown trees. Considering the usual scarcity of trees in the smaller diameter classes in our yellow pine type these losses were quite heavy. All of the plots were logged by tractors and high wheels and although none of the area supported much advance reproduction, a large percentage of it was destroyed by logging.

Pf-Snag Falling Study

Most of Simson's time during the month was spent on the snag falling study which is being carried on cooperatively with the Columbia National Forest in connection with a road project. This is proving to be a very worth-while undertaking from the research point of view, and indicates that with the equipment now in use, and where it can be used, for even the smaller diameter snags it is both quicker and cheaper to fall them by boring and blasting than by sawing. It is by way of coincidence that one of the several lightning fires occurring on the Columbia National Forest on May 21 started only eight miles from where the snag-shooting crew was at work. Thus the "snag shooters" were able to make immediate application of their newly found knowledge. Fifteen or sixteen snags were ignited before the fire was extinguished and they started many spot fires. Probably about an acre was burned, though more than that amount of ground was spotted over. The fire received almost purely mechanical treatment in that no line was built, the attack being largely by means of fire pump and boring and blasting. Dynamite and a portable drilling outfit appear to offer new hope to a snag-ridden region.

Douglas Fir Reproduction on Cutover Semi-permanent Plots

Isaac spent the month in the field making the first examination of the entire circuit of Douglas fir semi-permanent reproduction plots, and establishing a new group of 10 plots in the gravel soil region near Shelton, Washington. This circuit now consists of 17 groups of sample plots, with an average of 15 plots in a group. Each of the 17 groups represents definite site conditions in various parts of the Douglas fir region of Washington and Oregon. The 1928 seedling crop on the plots as a whole is exceedingly light but is about what may be expected from the light seed crop of 1927. More germination may occur later in the season.

Physical Factors Controlling Douglas Fir Germination and Survival

At the Wind River branch station Isaac got under way the various germination studies and made the first examination of the intensive reproduction study plots upon which the factors influencing natural reproduction are being measured! Isaac reports a heavy germination on these plots where seeded spots were covered with screen cones. The same areas heavily seeded the preceding year but not screened against birds and rodents gave practically no germination during 1927. The exceedingly dry period that occurred during the middle of the month took a heavy toll of the 1928 seedlings that germinated in rotten wood on these plots.

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NORTHERN ROCKY MOUNTAIN FOREST EXP. STATION

The first remeasurement of eight western white pine yield plots on the Coeur d'Alene Forest was completed after nearly three weeks of work participated in most of the time by Weidman, Gisborne, Marshall and two field assistants. Altogether about 9,600 trees were measured for half-decade diameter growth and a certain percentage measured for height growth. The stands on these plots are 40 to 100 years old. An appreciable mortality due to root rot was apparent on some of the plots, and Dr. Hubert, of the University of Idaho, has tentatively identified a sample as Armillaria mellea.

One of the two-acre sample plots examined offered an excellent example of how trees sometimes have been, but never should be, tagged. Remeasurements are always facilitated by numbering the trees consecutively across the plot and back on narrow strips, usually following the general contour of the land. When the trees are tagged originally in this manner the remeasuring and recording proceeds systematically according to the consecutive numbers and no trees are omitted. The plot in question was laid out by a man detailed to the Station for a few months, who was apparently totally inexperienced in such work. The result was a most erratic sort of tagging in which, for example, tree No. 1642 was followed by tree No. 4, which in turn was followed by tree No. 189. With 2,800 tagged trees on the plot, a hundred irregularities like this produces the utmost confusion and inefficiency in remeasurement. The work required just 50 per cent more time than had been necessary on other similar plots properly tagged. Furthermore, to prevent excessive labor in future re-examinations, it will be necessary to retag all the trees on this plot.

During the week of May 21 to 26 a fire conference was held at the Priest River Branch Station, conducted by Messrs. Morrell, Stockdale and Flint, and attended by all the western Montana and northern Idaho Supervisors. Mr. Brundage from the Portland office, and Mr. Kircher from

Washington, were also in attendance. The mile and a half of fire-control line constructed in 1924 to help protect the southern border of the demonstration forest was inspected and generally approved as worthwhile, even though no maintenance work has been done since its construction. A half day also was given to an inspection of several of the thinning and yield plots, and to fire studies. The need of more work on weather forecasting by the Weather Bureau in this region was stressed. In comparison with the importance of the fire problem in other regions, District One receives only a very small proportion of the funds and effort needed to provide the character of forecasts desired and essential for the best protection.

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SOUTHWESTERN FOREST EXPERIMENT STATION

The month of May has brought on a full resumption of field work. Krauch and Lexen moved to Fort Valley about the first of the month. Pearson returned from Washington the 18th. Cooperrider and Copple have shifted the scene of their activities from Roosevelt to Fort Valley for the summer. Baumhofer of the Bureau of Entomology spent almost the entire month at Fort Valley and vicinity studying the tip moth. Horn of the Biological Survey is back on the job counting up the porcupines that partook of his poison baits during the winter.

Krauch and Lexen devoted most of the month to making counts on experimental plantings. Most of the plots date back to 1912-14. The prevalence of missing stakes and the irregular spacing of surviving trees has demonstrated the wisdom of tagging each plant, as was done several years ago. Most of the plantings show fair survival, but growth has been slow. Fifteen-year old trees are 5-6 feet tall if they are fortunate enough to have escaped many visitations of the tip moth. Having recently seen the plantations at Bogalusa where slash pine attains a height of 6-ft. in three years, the writer has lost some of his old-time enthusiasm about planting in the Southwest.

A series of competition plots to ascertain the effect of herbaceous vegetation on reproduction of western yellow pine has recently been laid out. The following treatments are to be compared: complete denuding, removal of grasses, removal of forbs (Clement's name for non-grasslike plants), burning and clipping to two heights. A double series will be run, one being fenced against rodents and the other against livestock only. The plots are all to be charted.

Another experiment which promises to throw light on the reproduction problem is the potting of seedlings in soils taken from spots where seedlings and native vegetation indicate local variations. A series of 10 pots have been planted to western yellow pine 1-year old seedlings. Similar series of Engelmann spruce and Douglas fir are contemplated.

MANUSCRIPTS

APPALACHIAN

"America Bids Goodbye to Her Chestnut," C. F. Korstian (To Economic Geography)

PACIFIC NORTHWEST

"Understocked Stands," W. H. Meyer (Note for Jour. For.)

"Predicting Yields of Average Stands of Douglas Fir. W. H. Meyer.

"Bankers and the Forest Problem." T. T. Munger (Paper for meeting of Oregon Bankers Ass'n).

"Comparison of the Stationary and Whirling Psychrometers." A. G. Simson.

"Static and Relative Humidity" A. G. Simson (Progress report).

"Measured Flight of Seed Released from Pilot Balloons and from Box Kite." Leo A. Isaac (File Report).

NORTHEASTERN

Annual Investigative Program, 1928.

Preliminary Yield Tables for Second Growth Western Yellow Pine. E. C. Behre (To Jour. Agr. Res.)

DISTRICT 2

Effect of Thinnings on Sapling Douglas Fir in the Central Rocky Mountain Region. J. Roeser (Progress Report)

CENTRAL STATES

The Relation of the Forest Experiment Stations to the Extension Program. E. F. McCarthy.

IN PRINT

- Bates, C. G. and A. J. Henry - Second Phase of Streamflow Experiment at Wagon Wheel Gap, Colo., Monthly Wea. Rev. March, 1928.
- Demmon, E. L. The Southern Forest Experiment Station: Its Work for Naval Stores Industry. (Naval Stores Review, April 28, 1928.)
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- McArdle, R. E. Rate of Growth of Douglas Fir Forests. (West Coast Lumberman, May 1, 1928.)
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OFFICE OF FOREST PRODUCTS - District One

Woods Waste Studies

Preliminary work on the woods waste survey in logging was continued as planned. During May Mr. Anderson spent three weeks in the field on trips which extended into both the western yellow pine and western white pine types of Montana and North Idaho. A number of sample plots were taken in each type so that the adaptability of the tally sheets for field use could be actually tested on the ground. The forms designed as a part of the working plan have proved satisfactory.

While passing through Spokane on May 18, Mr. Anderson interviewed E. H. Records, President of the Vegalene Company which has been developing a plant designed to produce ethyl alcohol from potatoes and wood waste. About \$140,000 has been expended on this enterprise to date. The plant is located on the banks of the Spokane River at Greenacres, thus giving a plentiful supply of water which is necessary in the manufacture of alcohol from wood waste.

Equipment for the potato process is complete and in working order, but not working to capacity, only one man being employed at the present time. When operated to capacity a crew of six men is required and 50,000 tons of potatoes could be used annually. At present they are able to buy their potato requirements for \$6.00 per ton f.o.b. the plant. Vegalene and ethyl alcohol are the principal products of the potato process, so no motor fuel is manufactured at the plant, vegalene being only a gasoline energizer similar to numerous patented compounds now on the market. The same claims are made for vegalene gas as for ethyl gasoline, or that power and mileage are increased from 20 to 25 per cent.

The wood waste hydrolysis plant is not complete and has never as yet been in shape for operation. About \$7,000 has been expended on it to date, and Mr. Records has estimated that an additional \$4,000 will be required before the plant will be ready to operate. He did not know when that would be. The plant equipment and processes are almost identical with those given in Bulletin #983, except that by alleged improvements in the diffusion and settling tank processes the sugar content is raised considerably above that of the present commercial processes.

Foundations and housing improvements for two digesters are already in place but only one digester has been installed. It is of the rotating type and spherical with dished ends, having a capacity of 25 tons daily of hogged mill waste, if operated on a 24-hour basis. Thus, were the plant complete it would have a capacity of 50 tons of waste daily. No wood waste storage has been provided but Mr. Records said the material would be supplied currently by trucks or rail from local sawmills. The sawdust conveyor is in place and extends to the digester storage platform

20 feet above the digesters so the material is gravity fed into the digesters along with the sulphuric acid. Diffusion and settling tanks, also pipe and fittings, are now on the ground, but not installed. The balance of the process will be carried on in the same equipment as is now installed for the potato alcohol plant. Coolers, fermenting vats, stills and power plant are in place and in use at the present time in the potato alcohol manufacture. Mr. Records believes that a combination wood waste and vegetable alcohol plant are ideal, since the latter part of the process from the fermenting vats through the stills is identical for the two processes.

While this company does not appear to be especially well financed, it will be interesting to watch their development.

Logging Output Studies

Mr. Bradner spent most of the month in rewriting about two-thirds of the proposed logging output bulletin. Many changes have been made both in the form of presentation and arrangement of the subject matter.

Census

A fairly good response was received from the special requests mailed to 125 delinquents on May 10, and since that date 80 reports have been obtained by personal solicitation in the field. Whitney spent about 11 days in calling upon delinquent establishments located in Benewah, Kootenai and Clearwater Counties, Idaho, while Anderson cleared the list of a number of cases in Northwestern Montana. While there are still a few concerns which have not reported, several of these have promised to send in their returns and it is hoped that the Idaho-Montana canvass can be closed within the next two weeks.

A shipment of 160 completed schedules was made to the Forester on May 12, and another consignment, including about the same number will be forwarded to Washington in a few days.

Reports

The 1927 stumpage price report was completed and mailed to the Forester on May 28. This report contains information on 159 transactions, of which 105, covering 438,574 M ft. of saw timber, were reported in connection with the 1927 census canvass. A separate canvass by the Forest Supervisors including records from some other sources, covered 54 transactions aggregating 220,058 M feet of saw timber.

Lumber Prices

Av. Mill-Run Prices	Annual 1927	Annual 1928	First Q. 1928	April 1928
Idaho White Pine	\$35.86	\$30.17	\$30.20	\$30.59
Western Yellow Pine	25.17	24.19	26.55	24.22
Larch-Fir	18.19	16.38	17.60	17.77
White Fir	17.41	16.80	17.89	18.57
Spruce	23.39	25.67	24.35	23.70

<u>Shipment and Cut</u>	<u>First Quarter 1927</u>	<u>First Quarter 1928</u>
Shipments	374,011 M ft.	322,013 M ft.
Cut	267,133 "	209,726 "

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OFFICE OF FOREST PRODUCTS - District Six

Madison Laboratory Conference

Mr. Gibbons left Portland May 31 to attend the annual plan of work conference at the Madison Laboratory which will be in session from June 4 to June 19. He plans to be away until about July 1.

General Wood-Waste Survey in the Douglas Fir Region

The computation and tabulation of results of the field work has taken all of Mr. Hodgson's time during the month. He has now practically completed the job of comparing the relationship of factors as they affect utilization in the Douglas fir forests. The outcome of this comparison is shown, in very summarized form, in the following table. Most of the contrasted percentages show that the study will bring out some quite positive results.

Relationship of Factors as They Affect Utilization in the Douglas Fir Forests
(Woods Waste Expressed in Per Cent. Based on Volume of Original Stand).

Factors	: Logger- : Manufacturer	: Independent : Logger
Railroad haul of less than 20 miles	: 15.2	: 22.2
Railroad haul of more than 20 miles	: 20.3	: 23.8
Operating on National Forest Timber Sales	: 15.1	: 20.1
Operating in privately-owned stumpage	: 18.3	: 22.3
Using single donkey haul	: 19.9	: 21.9
Using double donkey haul	: 16.8	: 23.8
Operating on level topography	: 14.3	: 20.6
Operating on steep topography	: 21.4	: 26.1
Operating on smooth ground	: 14.5	: 19.2
Operating on broken ground	: 21.6	: 26.0
Operating in sound timber	: 14.3	: 22.1
Operating in defective timber	: 31.9	: 24.8
Operating cargo sawmills	: 17.5	: -
Operating inland sawmills	: 19.8	: -
Operating in timber consisting of less than 30 per cent western hemlock or "white" fir	: 18.6	: 19.6
Operating in timber consisting of more than 30 per cent western hemlock and "white" fir	: 16.8	: 24.5

Sawmill Utilization Studies (Shevlin-Hixon Mill)

Final arrangements have been made to carry on a sawmill utilization study in the western yellow pine operation of the Shevlin-Hixon Lumber Company at Bend, Oregon. The field work will start early in September and will run for about two weeks. It will be handled as a cooperative study by the following organizations: Office of Forest Products, Office of Forest Management, Pacific Northwest Forest Experiment Station, Deschutes National Forest, Mr. N. G. Jacobsen, of the Western Forestry & Conservation Association, and the Shevlin-Hixon Lumber Company.

This study will be very detailed in that complete data will be secured as to every log in each tree from the standing forest to the final lumber tally in the mill.

Mr. Spelman is now in Eastern Oregon looking over a number of pine logging operations for the purpose of building up a back-ground which will enable him to conduct the time study work and other details of the logging operation, which will become a part of the Shevlin-Hixon Mill study.

Sawmill Utilization Studies (Mt. Emily Mill)

The compilation of data for the Western pine utilization study conducted at the Mt. Emily Lumber Company's mill at La Grande, Oregon, last November is well on its way.

Four hundred and seventy three woods-run western yellow pine logs included in the study were scaled by the company's scaler as well as by the Forest Service scale.

In both the Forest Service scale and the Company scale the Decimal C rule was used. The comparative scale together with the total green lumber tally was as follows:

Number of logs.	473
Volume average log, gross log scale, Service.	149 ft.
Volume average log, gross log scale, Company.	143 ft.
Volume average log, net log scale, Service.	145 ft.
Volume average log, net log scale, Company.	137 ft.
Total green lumber tally, No. 5 Com., 6-ft. shorts & btr.	83,440 ft.
Overrun, basis total lumber tally and Service scale	14,690 ft.
Overrun, basis total lumber tally and Service scale	21 %
Overrun, basis total lumber tally and Company scale	18,421 ft.
Overrun, basis total lumber tally and Company scale	28 %

Air-Seasoning Study

Final arrangements have been completed to put on a small air-seasoning study at Mill "B" of the Weyerhaeuser Timber Co., Everett, Wash. The Bureau of Grades of the West Coast Lumbermen's Association is cooperating in the study by supplying the inspector to grade the stock throughout the study.

The study will consist of four piles of 1x12"-16' No. 1 Common Douglas fir. Two of the piles will be self-stuck and two piled with 1x4" special stickers. In each of the two piles, one pile will be put up using $2\frac{1}{2}$ " spacing between boards in a layer and one with $3\frac{1}{2}$ " spacing. A modified form of box-piling as practiced by the Company will be used.

Mr. Johnson will start piling the stock June 4, with the result that it will be up during the most rapid drying season of the year. It is planned to take the stock down about the middle of August or earlier if thoroughly air-dry. Aside from the two variables, the study will differ from those carried on previously in that more current drying rate samples will be placed in each pile, also a greater number of whole board samples.

Census

Of 2,016 listed companies, 2012 have been taken care of to date, 4 companies remaining to be heard from. A total of 1,473 schedules have been sent to Washington, including 180 in May.

Little-Used Species

During the month Mr. Johnson secured additional data relative to the consumption of bigleaf maple in Oregon and Washington in 1927. It seems that in 1927 approximately 5-3/4 million feet was consumed in these two states. Of this about 2,900 M feet was consumed by the furniture industry and 2,200 M feet by the chair industry.

Felling and Bucking Study in the Douglas Fir Region

Four weeks was spent by Mr. Spelman in the field on this project during the latter part of April and the first three weeks in May. The object of the trip was to check up the working plan and to make an extensive reconnaissance of the general practices of falling and bucking work in the region. Eleven camps, six in Oregon and five in Washington, were visited, - none of which were logging government timber.

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FOREST ECONOMICS

Statistics

Most of Pierson's time during the month was spent in assisting Culley and Nelson in compiling and checking field data from the Jornada, Santa Rita and Great Basin Stations. This cooperation relieved the Station men of masses of compilation and permitted them to utilize their time in Washington to the best advantage.

Lumber Census, 1927. District 2 and District 3 have sent in all their reports. District 4, District 1, and District 6 have transmitted a large percentage of their questionnaires. The reports were given a preliminary examination and transmitted to the Census, which is preparing for the usual preliminary report by identical mills.

Lumber Distribution, 1928. Looking forward to the lumber distribution project for 1928, it appears desirable to amplify the resulting statistics by showing the destination of exports to foreign countries. In order to obtain reliable estimates of consumption and per capita consumption by States it is also necessary to have indications of the distribution to the States of our heavy imports from Canada. An indication of the amounts carried by rail, water, etc., also seems desirable.

Serious consideration has therefore been given to the use of a one-sheet questionnaire instead of the Form D card, and to cooperation with the Dominion Bureau of Statistics. Under the proposed plan we would show American exports from the States of origin to the Canadian Provinces as destinations, and receive Canadian estimates of their exports in similar detail.

At the end of the month Reynolds went to Ottawa and laid this plan before the Dominion Statistician in considerable detail. The Canadian authorities have not definitely committed themselves to cooperate, but their attitude was distinctly favorable, and unless some unforeseen obstacle prevents it is believed that a working plan for informal cooperation may be put into effect for 1928. Eventually such cooperation might be extended to other projects.

Canadian Forest Statistics. While at the Dominion Bureau of Statistics, which corresponds to the American Bureau of the Census, attention was given to the nature and scope of their inquiries into forest statistics. Their scheme appears to be logical and more complete in some respects than ours is at present. They have, for instance, a bulletin of primary production which is sent to woods operators and from which they get biennially a statement of logs, ties, mine timber, poles, posts, piling, rails, and other round and split

materials annually taken from the forest. Years ago the Census Bureau conducted an inquiry of this kind, but it was found difficult to handle and fell into disuse. Nevertheless it appears that figures from this source would be of great service as an index of total depletion. The Canadians also have a questionnaire addressed to farmers in the Census of Agriculture which gets a much better statement than we have of the forest materials derived from farm woodlots.

They also get through their Census of Manufactures statements of the quantities of wood consumed by various wood-using industries. The returns are not in as great detail as those of our State wood-using industries bulletins, but afford useful indices of the requirements of those industries.

It should be observed, however, that the Canadians have a relatively small job in canvassing their entire production machinery as they have only nine States and only about one-fifth the number of sawmills compared with the United States. Canadian preliminary reports print the mailing lists which is desirable in some respects. The completed bulletins are printed in both English and French.

Forest Depletion

The Canadian record of annual depletion works out quite differently from that of the United States. Very much higher percentages of the total use are charged by Canada to losses by fire, insects and disease. The fuelwood record differs in the opposite way, showing a smaller percentage of total use than in the United States. Per capita consumption of fuelwood appears to be only slightly less in the United States than in Canada, which, in view of Canada's imports of coal and northerly latitude, is an important item for future investigation.

Annual Forest Depletion, United States and Canada

Kind	United States, 1922		Canada, 1924	
	M cubic feet	Per cent of use	M cubic feet	Per cent of use
Fuelwood	9,500,000	42	866,000	31
Lumber	8,256,300	37	850,000	30
Pulpwood	585,000	3	544,000	19
All other use	4,064,200	18	549,000	20
Total use	22,405,500	100	2,809,000	100
Losses by fire	1,080,000	5	750,000	27
Insects, disease, etc.	1,300,000	6	1,441,000	51
Total destruction	2,380,000	11	2,191,000	78
Total depletion	24,875,000	..	5,000,000	..

Stumpage and Log Prices Study

Prior to 1922 the Forest Service had accumulated considerable information on the prices at which private timber had changed hands, particularly in the case of southern yellow pine and Douglas fir. No attempt had been made, however, to collect data in a systematic manner for all species and regions. In 1922 a schedule designed to obtain as complete information as possible on timber sales such as area of timber tract, amount of merchantable timber by species, price paid or received, virgin or second growth, quality, distance from timber tract to sawmill, and location (county and State) was included with the lumber manufacturers schedule to sawmills and loggers under a cooperative agreement with the Bureau of the Census.

The 1922 schedule requested data on stumpage transactions of record or reliable memory by years for the period 1900-1922 inclusive. A large amount of data was collected, but much of it was incomplete in essential features. About 90 per cent of the reports received, however, were straightened out by correspondence. Data on log prices were collected at the same time and for the same period for all regions east of the Mississippi River. Since 1922 both log and stumpage prices have been collected annually. All figures obtained have not been summarized into tables showing weighted average prices by species and regions. Such prices are, of course, not applicable to any given tract of standing timber but are useful for comparative purposes and to develop the trends of prices under different conditions.

Altogether about 45,000 species reports have been received. Approximately 6,000 stumpage price and 5,000 log price records have been collected annually since 1923. The amount of merchantable timber involved in annual transactions is around 25,000,000 M feet, more than one-half the annual lumber cut in the United States.

To facilitate the study and to differentiate between a variety of conditions surrounding timber sales in widely separated regions the States have been grouped into regions as follows:

- New England
- Middle Atlantic
- Lake States
- Central States
- Appalachian
- South Atlantic
- Lower Mississippi
- Rocky Mountain
- Inland Empire
- Northwest and the State of California

Tables have been prepared in the progress of this study showing current prices and price trends of the major species grouped by virgin and second growth hardwoods and softwoods by regions, virgin and second growth species prices by regions, species by quantity and species by flat rate and species rate sales.

During the past two years Boyce, who has been conducting this study, has been interrupted by other work in analyzing the data and preparing the text for publication. The study will be completed by Mr. Boyce this year.

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REPORT OF THE FOREST TAXATION INQUIRY

The staff has been occupied almost entirely with office work this month. Progress has been made in the study of data on tax conditions in the Lake States. The proposed Progress Report dealing with the resources and tax base in Minnesota was given considerable attention, and made the subject of several conferences. This is the first statistical report to be issued by the organization, and many questions of detail had to be settled for this and similar reports to be issued in the future. A final draft is now being prepared, and it is hoped that this report will be issued in June.

Fairchild and Hall attended the meeting of the Northeastern Forest Research Council at Springfield on May 1. The question of the best place to begin a study of forest taxation in New England was discussed, and the Council recommended the State of New Hampshire. In accordance with this recommendation correspondence has been initiated with the State Forester and with members of the State Tax Commission and the Special Recess Tax Commission with a view to a conference of those interested in such a study.

On May 18 Fairchild was a guest at a luncheon in New York City given by Mr. Charles Lathrop Pack in honor of the interim Minnesota Reforestation Commission, who are making a tour of investigation through the Eastern and Southern states. There was discussion of the work and plans of the Inquiry.

Murphy has been in New Haven for the last half of the month, for the purpose of consultation with reference to the work he has been conducting in Washington and to other activities of the organization. He is completing his abstract of forest tax laws.

The question of selection of a man to fill the position of economist on the staff has been given attention this month. A scarcity of prospective eligibles presents difficulties, and as yet no appointment has been made.

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RANGE RESEARCH

Washington

Chapline Attends Hearing on Erosion Bill

Senator Sheppard introduced in the past session of Congress a bill, S. 3484, entitled "For the conservation of rainfall in the United States." It is essentially a bill providing for the study of erosion.

At the request of the Bureau of Chemistry and Soils, Mr. Chapline attended a departmental conference on this bill and later was appointed a member of the Departmental Committee to draft the Department's report to the Senate Committee on Agriculture, which report outlined the erosion situation, the studies to be undertaken under the bill and recommended its approval. The Department construed S. 3484 as aimed largely to provide a program for the soil and engineering studies connected with the erosion problem. The McSweeney-McNary forest research Act already provides for the study of the influence in the conservation of the runoff and the control of erosion of tree and other vegetative cover and its management on forest lands, and of the herbaceous and shrubby cover and its management on range lands.

On May 3 Mr. Chapline appeared at the hearings on Mr. Sheppard's bill before the Senate Committee on Agriculture. His statement to the Committee outlined what the Forest Service is stressing in flood control, the studies of erosion that have been made by the Service to date, those we now have under way, and the need for more intensive work. The Committee appeared to be favorably impressed with the need for more adequate erosion studies by the Department. The bill passed the Senate but got caught in the jam of legislation and never came up in the House.

Nelson and Culley Complete Details

Mr. Nelson left Washington on May 10 to return to the Great Basin Experiment Station after completing a rather thorough analysis of the 12 years' vegetative data at the Jornada Range Reserve. Using this material as a basis, he prepared a manuscript on the revegetation of the black grama type of range in southern New Mexico. Nelson's detail not only afforded him the opportunity of getting an insight into the work of the Washington Office, but it also proved of material assistance in the handling of a number of features of the range research work.

Director Culley left here the latter part of May by car for the Santa Rita. During his four months' detail Culley made a rather thorough compilation of the 13 years' data at the Santa Rita Range Reserve.

In addition to utilizing this compilation as a basis for the Santa Rita bulletin it will have a bearing on the modifications made in the management plan to be applied on the reserve during the next 10 years, or the period of the new agreements. Mr. Culley also feels that it has pointed the way to certain desirable changes in the investigations at the reserve.

Junior Range Examiner Register Out

The Junior Range Examiner register finally came (June 15) from the Civil Service Commission carrying 9 names. Alden B. Hatch, no. 1 on the register, with a grade of 81.08 who worked one summer at the Northern Rocky Mountain Forest Experiment Station, has been offered appointment at the Appalachian Forest Experiment Station. He expects to go to Yale this winter for graduate work. No other appointments are planned by research from the register.

Early in May Miss Hayes and Mr. Chapline spent several days grading the theses which completed the grading of the examination papers.

Articles on Soil Erosion

The New York Times carried an editorial under date of May 28 on part 2 of Department Circular 33, "Soil Erosion a National Menace," emphasizing particularly the need for action to correct this on federal lands in the West.

The Cattleman for June 1928 also carried a several page article on part 2 of the circular and included 2 very fine pictures in Texas. They also state that the Federal Intermediate Credit Bank of Houston, Texas, now insists on erosion safe-guards before long-time land loans will be made.

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RANGE FORAGE INVESTIGATIONS

Report on Nomenclature to District 4

District 4, in straightening out the Ogden office herbarium, discovered plants of 73 species which they were unable to place in Tidestrom's "Flora of Utah and Nevada." Dayton has endeavored to straighten these out as far as possible. Many of these are cases of pure synonymy, which could have been solved in the District had the synonymy in Mr. Tidestrom's Flora been as full as he wished. Mr. Tidestrom got the impression, however, that the U. S. Museum authorities wished only the "name-bringing" synonymy in that book and hence the synonymy does not include many of the names familiar in the other manuals and in our range plant identification work. The synonymy in Mr. Tidestrom's mss. Flora of Arizona is much fuller we are glad to say. A considerable number of these perplexing

District 4 plants, however, appear to be neither cases of obsolete synonymy nor of clerical errors and will require check-identification, - a slow process in view of the amount of identification work now on hand in the Bureau of Plant Industry.

Lecture Before the Botanical Society of Washington

Dayton gave an illustrated lecture the evening of May 1st before the Botanical Society of Washington on some outstanding plants of western cattle ranges. The occasion was made memorable by the presence of Dr. Crocker, of the Boyce Thompson Institute, who gave an address, and by Dr. Coville who made some informal remarks on the origins of range research in the Forest Service, during the course of which he gave some interesting and hitherto unknown information on this subject.

English Grass Names

At Dr. Coville's request Dayton went over the common names to be used in Dr. Hitchcock's forthcoming manual of American grasses, and made a number of suggestions.

English Names of Poisonous Plants

At Dr. Coville's request Dayton had two additional conferences during the month with himself and Dr. C. Dwight Marsh over the English names to be used in the latter's forthcoming revised edition of his general poisonous plant bulletin. Dr. Marsh expressed himself as well pleased with the results of these conferences and, if the recommendations will "get by" the editorial authorities and the Government Printing Office, it is believed that an important forward step will be achieved with respect to the vernacular names of these plants.

District 6 Herbarium Matters

Mr. Douglas C. Ingram has been active in his attempts to straighten out the Portland office range plant herbarium. He has sent in some specimens that he cannot locate in the manuals. Among these are (1) cotype of Aconitum macilentum Greene, and (2) what, had it been published, would have been the cotype of Eriogonum glastifolium Greene. Aconitum macilentum Greene was published by the late Dr. Greene in a German botanical journal in 1914, the type being C. E. Fleming's no. 151 from Eagle Cap meadows on the Minam addition to the Whitman National Forest; this type has disappeared and the species has been among the mysteries of botany. This Portland office specimen has been deposited in the type collection of the U. S. National Herbarium and photographed for Forest Service records.

The specimen is merely somewhat depauperate Aconitum columbianum Nutt. Eriogonum glastifolium appears never to have been published by Dr. Greene and hence has no standing botanically; the specimen so named is evidently the common Eriogonum stellatum Benth.

Publications

Dayton prepared a brief illustrated paper, "Aconitum macilentum Greene," for publication in the Bulletin of the Torrey Botanical Club.

Plant Identification Routine

May was a busy month in shipments to the Bureau of Plant Industry, 1222 plants, representing 25 collections, being forwarded to the Bureau for determination (exclusive of all check-identifications). 258 photo-static prints of economic notes were sent to the field. 336 plants were mounted and approximately 100 were filed in the herbarium.

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DISTRICT - 3

Early May was crowded with the finishing of spring work on the browse range project and preparations for transfer of headquarters.

Copple and Cooperrider left Roosevelt for Flagstaff, Arizona, May 8.

Work has been resumed on the project on management and utilization of range in the sawtimber type. The western yellow pine reproduction plots have been examined and vegetative records taken on the experimental cattle range in preparation for the beginning of the grazing season.

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DISTRICT - 6

The early part of April was spent in compilation work on the project "Grazing Management of Cutover Lands" and the cleaning up of a number of minor items preparatory to the summer's field work. Nine tabulations have been prepared covering the three years' study of vegetative succession on the Columbia cutover area. These have been submitted to the Northwest Experiment Station for review and suggestion before the progress report on this project is put in final form.

April 9 - 14 was spent on the Mt. Hood Forest outlining to the rangers on three districts the purposes and methods used in the administrative grazing plot program. This trip followed a talk on "Our Native Plants" at Hood River on May 9 before the Hood River Garden Club.

The balance of April was spent on the Siskiyou Forest (Powers Area) with Forest Examiner Hanzlik and Ranger Cooper making the spring vegetative check. Due to the heavy rains vegetation was not as far advanced as had been expected although growth had well started. Germination of tree seedlings, however, had only just commenced. Charting of the transect was accordingly delayed until the midsummer examination. The outstanding observational features of the experiment continues to be the remarkable growth of the shrubs on the protected plots, in direct contrast to the suppression particularly of the palatability browse species where cattle grazing prevails. This is especially true on the area seeded to grasses where plots A and B are located. The most rapid growing of these shrubs, Ceanothus thyrsiflorus, shows a density on the three examination dates, as follows:

	5/12/27	10/21/27	4/26/28
Plot A (Inside)	12%	20%	40%
" A (Outside)	15%	15%	15%
" B (Inside)	15%	50%	60%
" B (Outside)	3%	5%	40%

On plot B inside it is apparent that this species at the present rate of growth will soon exclude practically all other vegetation.

While in the Powers section the area near Coquille seeded by airplane was visited with Ranger Cooper. A really remarkable and uniform stand of grass has been secured on this (last fall's) seeding consisting of rye grass, orchard grass and white and alsike clover. This Company (Coquille Land and Sheep Co.) used 4514 lbs. of rye grass, 3250 lbs. of orchard grass and 550 lbs. of white and alsike clover on the 1200 acres seeded by plane. \$659.00 was the total cost of the operation, including cost of seed, \$40.00 per hour was the price charged and $10\frac{3}{4}$ hours of running time required. The feed was heavy and averaged about 20 inches in height and was in excellent shape for the grazing of the 200 head of cattle which the Company proposed putting on the area on May 15, topping it prior to its use by their sheep later in the summer. The Coos Bay Lumber Co. at Powers, at first rather skeptical of airplane seeding, have become interested, and in all probability, will adopt similar methods in their seeding this fall. Due to its cheapness and rapidity there is a likelihood that this method will be adopted for seeding considerable areas of cutover land.

Probably the most important advantage of this method of seeding over hand seeding can be laid to the fact that plane seeding can be done and completed right after burning before the heavy fall rains pack the soil whereas seeding by hand, a much slower process, is often interrupted by the heavy rains which occur at this season.

An interesting experiment is being developed by the Oregon Agricultural College, in cooperation with the Forest Service and the State Board of Forestry, on the yellow pine cutover areas in the vicinity of Grants Pass. These areas, privately owned, have grown up to heavy stands of brush (Arctostaphylos viscida and Ceanothus integerrimus) and the owners desire to improve them for grazing purposes. By burning off the brush and seeding to certain species of cultivated forage grasses, in tracts of 30 or 40 acres, the owners hope to be able to keep down the heavy brush stands. Burning will be permitted under the control and direction of the local State Fire Wardens and the seed sown in the ashes this fall.

The spring recheck was likewise made on the Four-bit Area on the Crater Forest with Forest Examiners Hanzlik and Brown. Germination of the yellow pine seedlings had barely started this season by the middle of May.

Selection was made of two 1/2-acre plots of uncut timber type in accordance with the suggestion made by Grazing Inspector Hill last year. One of these will be fenced as soon as funds are available, cutting on the tract selected to take place sometime later this summer.

A week was spent on the Fremont Forest assisting the rangers on their administrative grazing plot work. An excellent start has been made on this forest, especially in Ranger Langfield's district, where 14 administrative plot enclosures are now under periodic observation.

The ranges seen to date in this district, although late due to the backward spring, give promise of an excellent stand of forage this season.

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JORNADA RANGE RESERVE

Range Conditions and Precipitation

General rains fell over the Reserve and adjacent ranges, amounting to 1.50" or better for the month. The rains were slow and gentle so that most of the moisture was taken into the soil. The growing season started about May 15 but development was slow due to the cool days and high winds.

Condition of Stock

The breeding herd showed perceptible improvement as a result of the green feed. Spring calves are numerous and in good shape. Branding should be completed early this year.

Investigative Work

Tree seedlings from the District 3 office were planted by Canfield during American Forest Week. Pits four feet square and four feet deep were excavated, and filled with loose earth for a foot or more. Then six inches of sand-debris mixture was thrown in and a three-inch iron pipe three feet long was set into the pit in a vertical position. As the remainder of the pit was filled with soil, the trees were planted in the usual manner. It is believed that the soil will receive sufficient aeration when the water poured into the pipes displaces the air in the porous layer of sand and debris, besides permitting subirrigation.

Numerous native flowers and shrubs have been set out as ornamental plants. Most of them are doing well.

Evaporation Data

A partial compilation of data from Livingstone atmometers conducted at five stations last season indicates very satisfactory results. With one exception, the rate of evaporation increased or decreased inversely with the amount of precipitation. During the early dry period of the summer the average daily evaporation varied from 80 to 105 cc. Later on, during the growing season, the rate dropped to between 25 and 55 cc. per day in the more exposed locations.

During one week at the start of the growing season, the average daily evaporation rate increased in exposed locations, but decreased in the midst of a clump of Prosopis glandulosa. It was found that this apparent discrepancy was due to the leaf production of the Prosopis, which through transpiration, raised the relative humidity. Consequently, the evaporation rate from the atmometer in the midst of the Prosopis clump was lowered.

Conservative Grazing Pays

The Station staff submitted to the Washington Office a preliminary manuscript of material for a Departmental Leaflet: "Conservative Grazing Pays."

After a discussion of the present status of the livestock industry, an illustrated definition of conservative grazing is presented. Then the benefits of conservative stocking are enumerated, set forth in such a manner as to show that conservative grazing pays.

In conclusion, the results of overstocking are set forth. The important point is brought out that there are vast losses to the individual and to the country which can not be accounted for merely in the number of carcasses on the range resulting from starvation. In the final sentence, the ranch owner is admonished thus: "Reduce the losses and the profits automatically increase."

Visitors

Prof. Wm. G. McGinnies and W. P. Pickrell of the University of Arizona were visitors at the Las Cruces Office on May 5.

W. W. Eggleston, poisonous plant investigator of the Bureau of Plant Industry, was a visitor May 6 and 7. He collected specimens of Astragalus from the Reserve and nearby ranges.

Personnel

Campbell went to the Gallinas District of the Lincoln N. F. during American Forest Week and made a talk at the Corona High School before a good audience. The description of experimental work on the Jornada was well received.

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SANTA RITA RANGE RESERVE

Precipitation and Growth

We have had no precipitation since the middle of February and practically no growth since the first week in April. We have had a total of .67 inch of rainfall at headquarters since February 15, but this was all from local showers which did not extend below the foothills. Mesquite and catclaw made a wonderful growth due to the snow in February, and bloomed profusely. Due to the continued dry weather and winds of the past two months nearly all of the bloom fell off and the bean crop will be very short.

Stock and Sales

Steer sales from the Reserve during May are of interest. Proctor shipped 38 head of yearlings which averaged 476 pounds and were sold at nine cents, an average of \$42.84 per head. Of Several hundred head shipped from Amado the same day, these steers were easily the tops, the bunch that came nearest averaging about 20 pounds less per head. On May 31 Ruelas shipped 38 head of two-year-old steers, and 48 head of yearlings. The twos averaged 696 pounds and sold at nine cents, bringing \$62.64 per head. The yearlings averaged 513 pounds and brought \$46.17 per head. The inspector who inspected and weighed these steers stated that they were by far the heaviest cattle that he had seen come off of the range this year. They were in very good condition, many being fat enough for beef, and this in spite of a very dry range. The moral: CONSERVATIVE STOCKING PAYS.

William Nicholson, who has been a cooperator on the Reserve for many years, has sold his ranch and cattle to Wirt D. Parker, who is also one of the Reserve cooperators. This deal consolidates the whole southern part of the Reserve into one outfit and will simplify administration and record keeping.

Field Day

On May 22 a field day was held on the Reserve in cooperation with the County Agricultural Agent of Pima County. Pima and Santa Cruz counties were well represented and the interest shown by these cattlemen in the work of the Reserve was well worth the effort of putting on such an event. Everyone brought his own lunch and coffee was furnished by the Reserve. The day was spent in the field where the following projects were studied: the clipping study, volume production of forage on an overgrazed range as compared to a range conservatively grazed, the period studies, and carrying capacity of the semi-desert, mesa, and foothill types of range. We hope to put on more of these events in the future.

Miscellaneous

Late in the evening of May 18 Baldy Lookout reported a fire on the north end of the Reserve. Upon arrival at the scene it was found that Mr. Ruelas and his son had already controlled the fire. A hunch was followed which resulted in finding the guilty party but he refused to admit anything except that he helped fight the fire. He left for parts unknown early the following morning before sufficient evidence to warrant an arrest could be gathered,--we do not expect him back soon. By a lucky chance he threw his match or cigarette down on the windward side of the road along which he was driving, and the fire was controlled before it gained sufficient impetus to cross the road, otherwise the area burned over would probably have been quite large. About $4\frac{1}{2}$ acres were burned.

Director Culley and family are on the way back to the Reserve from Washington and are expected to arrive about June 7, provided Matt does not become too intimately acquainted with the speed cops along the way and the mud is not too deep in Texas. .

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